

SPACE TRACKS

A BULLETIN ON NAVAL SPACE ISSUES AND INITIATIVES

May/June 1999

Vision for Space

The Navy's future will need to be capable of supporting all aspects of space operations in conjunction with warfighting in every dimension of the battle space. See Page 8

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13 Navy officer serves as "the piper"

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NAVSPACECOM DIRECTORY

Naval Space Command provides direct space support to Fleet and Fleet Marine Force operational units around the world, whether for routine deployments, exercises, or actions in response to a crisis situation. We take very seriously our duty of ensuring that our Sailors and Marines understand what products are available from space, how to access them, and how to exploit those products in the waging of war and peace.

○ **Operational Status/Exercise Support Summaries**

Naval Space Command maintains a home page on the Global Command and Control System (GCCS) accessible to operational U.S. military forces worldwide at <http://navspac1.navspace.navy.smil.mil> or <http://206.36.197.10>.

○ **Naval Space Operations Center** (540) 653-6500

Call Toll-Free at 1-888-404-6557. Source of space-related operational intelligence. Space reports and analyses are activated on request and are tailored to a deploying unit's operations and geographic area of movement. Tactical assessments of space system capabilities and vulnerabilities to potentially hostile space sensors are also available.

○ **Naval Space Support** (540) 653-6160

Naval Space Support Teams provide tailored information and training at all operational levels to include on-site training, exercise support, and staff augmentation.

○ **Remote Earth Sensing Information Center** (540) 653-6520

Naval space Command employs imagery from remote Earth sensing satellites to support intelligence, planning, and operations. Our Remote Earth Sensing Information Center (RESIC) — formerly known as the MSI Cell — processes Landsat, SPOT, and Controlled Image Base (CIB) data in support of Fleet and Fleet Marine Force units. Hardcopy and softcopy products, specifically tailored to users' needs, are produced by RESIC and distributed to support forces participating in real-world crisis, operations, and exercises. RESIC products can be produced to support any of the following applications:

Planning	Intelligence Prep of the Battlefield
Target Area Analysis	Mission Rehearsal
Bathymetry	Amphibious Support
Order of Battle Disposition	Supplement MC&G Products
Change Detection	Trafficability
Broad Area Coverage	

Product requests can be submitted via GENADMIN message to: COMNAV-SPACECOM DAHLGREN VA//N313//, via facsimile to DSN 249-6167 or (540) 653-6167, via email to MSI@manta.nosc.mil, or via Naval Space Command's SIPRNET web page.

○ **Internet On-Line Access**

Naval Space Command maintains a home page on the World Wide Web at URL <http://www.navspace.navy.mil>. Comments or requests for information may be forwarded to the Public Affairs Office via email to gwagner@nsc.navy.mil.



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Y2K Demonstration Successful

Naval Space Command successfully completed an operational evaluation in March that demonstrated the command's ability to execute its mission end-to-end in a Y2K environment.

The four-day evaluation was coordinated with U.S. Space Command as an "end-to-end test" of mission critical systems shared or configured between the two organizations. The Joint Chiefs of Staff directed DoD commands to conduct end-to-end tests to assure all critical components are ready for the Year 2000 rollover.

DoD has required all systems to participate in at least two end-to-end exercises before Jan. 1, 2000, and a system cannot participate until it is Y2K compliant and certified. Naval Space Command successfully executed its mission in support of U.S. Space Command as the Naval Space Control Center throughout the test conducted in March, which incorporated live sensor data from four participating Space Surveillance Network sensors.

According to Cmdr. Roger Wells, Y2K Operational Evaluation lead officer for NAVSPACECOM, each end-to-end

test requires two to three months of coordination and preparation prior to the event, and several weeks afterward to analyze and document the results and deficiencies. "Coordination among all the players is key to the success and effectiveness of these tests," Wells emphasizes.

Jacobs, Naval Space Command's Y2K coordinator.

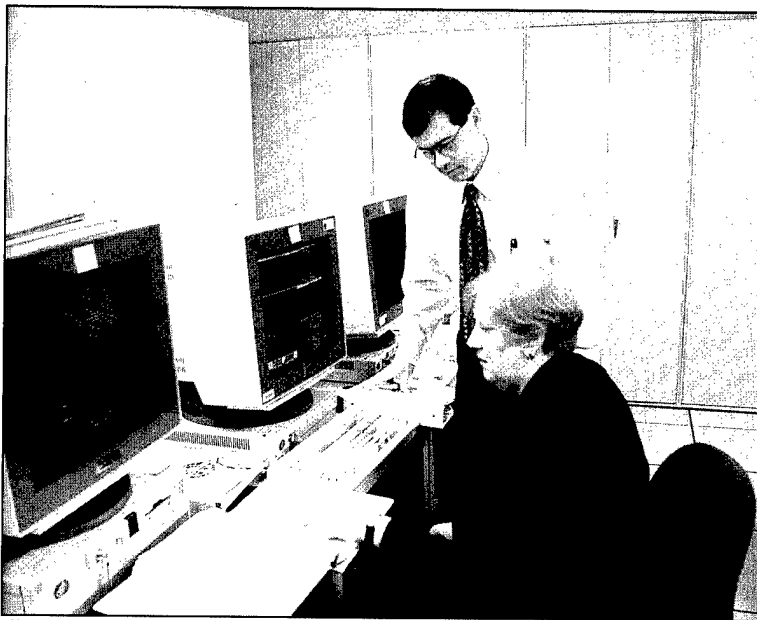
"Less than 300 days remain for us to ensure all potential Year 2000 trouble areas have been tested and will continue to operate during the rollover into 2000 and throughout the year," says Jacobs.

"Naval Space Command personnel are working diligently to adhere to very tight schedules that cannot slip. Besides completing the operating system's upgrade, they are conducting the end-to-end tests with U.S. Space Command's systems."

Jacobs maintains that status reporting and updating are as essential to this effort as fixing any date problems. She feels it is essential to every citizen's peace of mind to know how well the command is handling the Y2K problem. "It has taken the dedication and time of all our personnel to ensure all areas of the command, its

missions, and functions will operate into the next millenium," she said.

"Thanks to the support of everyone at Naval Space Command, we plan to roll into Year 2000 smoothly."



Jim Rose from Naval Space Command's Intelligence/Operations Division and Jean Rowe from the Information Systems Division review plans for the operational evaluation of the mission system.

DoD had established a deadline of Dec. 31, 1999, for total systems' compliance. While the deadline has passed, the Department of the Navy still has a few mission critical systems that "are not quite ready for Jan. 1, 2000," admits Diane

Navy Space Colorado Detachment Augmented

Naval Space Command has augmented its staff located at Peterson Air Force Base in Colorado Springs, Colo.

NAVSPACECOM, the naval component of U.S. Space Command headquartered at Peterson, established a small detachment there in 1987. The detachment, directed by a Navy captain as officer in charge, provided a liaison between U.S. Space Command's staff and NAVSPACECOM headquarters in Dahlgren, Va.

Prompted by its growing responsibility as a component of the unified space command, Naval Space Command initiated measures to provide additional personnel to support CINCSPACE's long-range planning activities, as well as exercises and crisis situations.

During fiscal year 1999, the Naval Space Command Detachment in Colorado Springs will grow from three people to a staff of eight members.

Key NAVSPACECOM staff posi-

tions formerly in Dahlgren that are being relocated to Colorado include the deputy commander and technical director. The deputy commander position is filled by a Marine colonel, while the technical director is a senior civilian billet.

One additional civilian position from Dahlgren was relocated at the detachment, and two new civilian positions were created to round out the augmented NAVSPACECOM office at Peterson.

SPACE BILLETS

OFFICERS The following is a partial listing of officer billets with space missions, whose incumbents are scheduled to transfer between January-October 2000. For specific billet information and actual availability dates, contact your detailee.

Billets With Subspecialty Code XX75 (Space Systems - General)

ACTIVITY	TITLE	BDES	BGRD	BSUB1	BSUB2	AVAIL
OPNAV	SPACERQMT ANAL/N63B DEP DIR	1050	CAPT	0075Q		0005
NSGCD DET POT DC	58 OIC SHR ACT CLASSIC WIZ OPS	1610	CDR	0075P		0008
OSD	DEPUTY	1000	CAPT	0075P		0009

Billets With Subspecialty Code XX76 (Space Systems - Operations)

ACTIVITY	TITLE	BDES	BGRD	BSUB1	BSUB2	AVAIL
CNSC DET VB	AF EXCHANGE OFF	1000	LCDR	0076P		AVAIL
CNSC DET VB	AF EXCHANGE OFF	1000	LCDR	0076P		AVAIL
OPNAV	PGM MGR WEPSYS/N63C PLN	1050	CAPT	0076R		0001
USSPACECOM	BMD PLNS OFF	1000	LCDR	0076S		0001
NSGA D/RAMROD	58 CLASSIC WIZ OPS/RAMROD CPF	1610	LCDR	0076P		0001
USSPAC CB OPSTAF	SPACE CONT ANAL	1000	LT	0076S		0002
NAVSPACECOM	OPS/INTEL ANAL/NSST	1050	LCDR	0076S		0002
NAVSPACECOM	OPS/INTEL ANAL/NSST	1320	LCDR	0076S		0002
NAVSPACECOM	OPS/INTEL ANAL/NSST	1000	LCDR	0076S		0003
NAVSPACECOM	OPS/INTEL ANAL/NSST	1000	LT	0076S		0003
JNTSTF JCS WASH	CINC C4 ACTION OFF	1000	CDR	0076S		0004
OSD	DEP DIR TECH COORD	1610	CDR	0076P		0005
USSPACECOM	SPACE SYS	1700	CDR	0076P		0005
USSPAC CB OPSTAF	SPC CONT OFF	1050	LT	0076S		0005
USSPAC CB OPSTAF	CH, COMBAT ANAL	1050	LCDR	0076S		0005
USSPAC CB OPSTAF	THT DP CREW CMDR	1700	LT	0076S		0005
COM7THFLT	STRK OPS	1300	LT	0076S		0005
USSPAC CB OPSTAF	SPACE CNTL CMDR	1050	CDR	0076S		0006
USSPACECOM	SPACE OPS OFFICER	1700	LT	0076S		0006
USSPACECOM	BMD PLNS OFF	1050	LCDR	0076S		0006
OPNAV	OPINTENL MGT/N632 HD TENCAP	1610	CDR	0076P		0007
OPNAV	SPACE ACQ/N633D ASST IMAGERY	1630	LCDR	0076P		0007
CNSG FT MEADE	98 CLASSIC WIZ OPS/HASP/G54	1610	LCDR	0076P		0007
USSPACECOM	V/DIR INTEL	1630	CAPT	0076S		0007
JNTSTF JCS WASH	ACTION OFFICER	1000	CDR	0076R		0007
SPAWAR SPTECH PG	SPACE ACQ/JOINT PROG MGR	1510	LCDR	0076P		0008
SPAWAR SPTECH PG	SPACE PJ TECH/MISSION SPT	1700	LCDR	0076P		0008
NSGCD DET POT DC	58 CLASSIC WIZ OPS/LIAISON	1610	LT	0076P		0008
COMNAVSPACE	DEP BR HD, PLANS & POLICY	1000	CDR	0076P		0010
CNSG FT MEADE	98 CLASSIC WIZ/OPS/LASP POLICY	1610	LT	0076P		0010
USSPACECOM	CH FORCE ENHNC BR	1000	CDR	0076P		0010
USSPAC CB OPSTAF	CMBT ANAL OFF	1050	LT	0076S		0010
USSPAC CB OPSTAF	CMD DIR	1050	CAPT	0076Q		0010
NSGCD POT P F MD	NSG SPEC OPS	1610	LT	0076P		0010
NAVSPACECOM	INTEL OFF	1630	LCDR	0076S		0010
NAVSPACECOM	OPS/INTEL ANAL/NSST	1630	LT	0076S		0010
NSA/CSS FT MEADE	ELXEQ RSCH ENG/RAMROD PROG	1610	LT	0076P		0010

Billets With Subspecialty Code XX77 (Space Systems - Engineering)

ACTIVITY	TITLE	BDES	BGRD	BSUB1	BSUB2	AVAIL
PEOSPACOMSENS	DEP DPJ MGR/DPM COMM SAT	1510	CAPT	0077P		0001
SPAWAR SPTECH PG	SPACE ACQ/LAUNCH SYS-MECH	1700	LT	0077P		0001
SPAWAR SPTECH PG	SPACE PF TECH/PROCESSING	1510	LCDR	0077P		0002
NCCOSC RDTE NWCF	ELXEQ RSCH	1000	CDR	0077P		0002
SPAWAR SPTECH PG	DPJ ENGCOOR/HD ADV PROG DIV	1510	CAPT	0077P		0005
NAVSOC PT MUGU	ELX ENG/SAT MGR	1000	LT	0077S		0005
SPAWARSYSOM	MAJ PJ MGR SEL/PM GLOBAL NAV	1510	CAPT	0077P		0006
COMNAVSPACE	PLANS/POLICY	1000	LT	0077P		0007
SPAWAR SPTECH PG	SPACE PJ TECH/PROCESSING	1510	CDR	0077P		0008
NAVAL ACAD	INST ENG	1440	LCDR	0077P		0010
SPAWAR SPTECH PG	SPACE ACQ/ENG OFF	1610	LCDR	0077P		0010

ENLISTED BILLETS

AT NAVAL SPACE COMMAND
DAHLGREN, VIRGINIA

Following is the allowance for enlisted personnel at Naval Space Command, Naval Surface Warfare Center Dahlgren Division, Dahlgren, Va. Dahlgren is located approximately 50 minutes from Washington, D.C., and three hours from Norfolk, Va. The base is also home to the Aegis Training & Readiness Center and the Navy's only active gun testing range. You will also find a small Navy Exchange, commissary, gymnasium, auto and wood hobby shops, year-round pool, library, chapel, theater, and numerous outdoor recreation facilities. If you would like more information about one of the Navy's "best kept secret" duty stations, or would like a welcome aboard package, feel free to contact Lt. Cmdr. Jane E. Hoffman at DSN 249-5152 or commercial (540) 653-5152 (email address: jhoffman@nsc.navy.mil) or the Command Master Chief, ETCM Alan Kinder. Master Chief Kinder can be reached at DSN 249-6115 or commercial (540) 653-6115 (email address: akinder@nsc.navy.mil). If you are interested in receiving orders to Naval Space Command, contact your detailee.

CTA:	E7:1	E6:2	E5:2	E4:1
CTR:		E6:1	E5:2	
EA:	E7:1			
ET:	E7:2		E5:4	E4:2
EW:	E8:1		E5:2	E4:2
FC:		E6:1		
IS:	E7:1	E6:2	E5:4	E4:3
NC:	E7:1			
OS:	E7:3	E6:5	E5:3	E4:13
RM:	E7:2	E6:3	E5:9	E4:1
SK:			E5:1	
YN:		E6:1	E5:2*	

*One YN2 billet is TAR.

Intelligence Branch Facilitates Responsive Space Support

Naval Space Command's Intelligence Branch is a small but unique group, currently consisting of one officer, two civilians, and 10 enlisted intelligence specialists. This branch provides a wide range of services including tailored space intelligence products, home page support for Fleet and Fleet Marine Forces, current intelligence briefs for the staff, and space control support to U.S. Space Command.

The Intelligence Branch is responsible for producing several space intelligence products including:

- Space Intelligence threat messages for deploying battle groups and supporting commands
- Worldwide satellite launch updates
- Guide to space systems
- Guide for interloping space systems
- Home pages for ready access to intelligence products, as well as battle group specific points of contact

In addition to space products, the Intelligence Branch makes key contributions to the following mission areas:

○ **Naval Space Operations Center (NAVSPOC):** The Intelligence Branch maintains situational awareness and is instrumental in developing a proactive support plan within the NAVSPOC. Specifically, the Intelligence Branch is responsible for constantly monitoring and assessing changes in the space order of battle. They use all available intelligence resources to ensure an accurate account is maintained on satellites belonging to the United States and all other nations. This information is used to alert operational forces of potential changes to space-based capabilities; the potential for hostile forces to use space-based systems; and recommended courses of action during these situations. The Intelligence Branch interfaces and coordinates on a daily basis with fleet support and space control elements within NAVSPACECOM to reach mission objectives.

○ **Naval Space Control Center (NSCC):** Several duties as NSCC watchstanders are filled with Intelligence Branch personnel. The head of the branch, Lt.Cmdr. Cole Evans, serves as one of the alternate crew commanders who provide overall command and control (C2) of the NSCC mis-

○ **Naval Space Support Team (NSST):** Recently, one IA was identified to augment and deploy with the NSST to enhance the team's technical expertise and capabilities. This arrangement provides a direct inject to the Fleet and Fleet Marine Forces on the most current space

threat and techniques available to counter that threat. Specifically, the IA presents detailed information on satellites that constitute a threat to our forces and provides their limitations and impact upon naval operations. This subject-matter expert can answer any questions and deliver a current and relevant assessment of the space threat they will face during deployment. Finally, the IA can better assess the needs of our customers and leverage the wealth of capabilities in the Intelligence Branch to continually

improve space support to the Fleet.

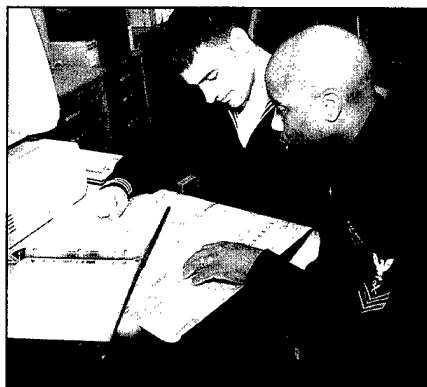
○ **Crisis Response Cell (CRC):** The Intelligence Branch is an integral part of Naval Space Command's CRC, which is formed during times dictated by world crisis, such as the situation in Kosovo. The CRC is composed of key decision makers at NAVSPACECOM who decide how to best support our deployed forces. The Intelligence Branch is responsible for providing on-call intelligence to the CRC.

"The Intelligence Branch serves a multitude of functions that make it a crucial part of Naval Space Command," states Lt.Cmdr. Evans. "Whether providing current intelligence briefs or support to the Fleet, the Intelligence Branch fulfills a vital role. This consistent level of diligent support marks Naval Space Command's Intelligence Branch as a dedicated source of tailored and responsive support to the naval warfighter."

He adds, "Precise and timely space intelligence support from our end will facilitate effective solutions to the challenges of the naval professionals out on the pointed end."



IS2 Walter Lloyd and Sam Martin (left to right) prepare the setup for a videoteleconference at Naval Space Command headquarters.



ISSR Keith Kappel and IS2 Lloyd (left to right) review charts of Kosovo in preparing an intelligence briefing.

sion during activations. This includes ensuring mission accomplishment of all surveillance and protection tasks. In addition, three members of the branch are qualified to stand the space surveillance officer (SSO) watch, which provides C2 for the Space Surveillance Network (SSN) during NSCC activations. Finally, all eight enlisted members are trained to stand the intelligence analyst (IA) watch. These watchstanders provide current Intelligence information to meet all mission requirements during NSCC activations.

*Insatiable demand for bandwidth prompting vigorous search
for increased use of commercial satellite communications services*

The Evolution of Navy Wideband SATCOM

By Robert T. Patterson

The Department of Defense (DoD) demand for bandwidth is far greater than can be handled by current government systems. Because of budget constraints, DoD-owned and operated systems will not be sufficient to satisfy the department's future information transfer needs.

Congress has mandated that DoD shall utilize, to the maximum extent possible, commercial SATCOM services to meet expanding bandwidth requirements. This has led DoD to seek additional means of communicating via commercial services.

From the maritime warfighter's perspective, SATCOM is the only solution to high bandwidth requirements. One a ship pulls away from the pier, there is no other link to the terrestrial infrastructure.

The Navy's initial venture into wideband SATCOM began with tests of super-high-frequency (SHF) capabilities onboard aircraft carriers in late 1990. By placing a Ground Mobile Forces (GMF) satellite communications terminal on the deck of USS Theodore Roosevelt (CVN 71), the increased capacity decreased the transmission time of an air tasking order from over six hours to a matter of minutes at data rates up to 256 Kbps.

In 1991, OPNAV borrowed several AN/TSC-93 terminals from the Air Force and Marine Corps and installed them on aircraft carriers, thus starting an era of SHF "QuickSat" terminals, bringing increased bandwidth capabilities to these ships. Because those terminals required such radical modifications to make them shipboard compatible, the Navy realized a need for a reliable wideband solution that could easily integrate into the existing shipboard communications architecture.

In the latter part of 1992, working on a concept developed in a master's thesis by Lt.Cmdr. John Hearing, Project Challenge Athena was born. Initially, Challenge Athena (CA) was a demonstration to test delivery of imagery data at 1.544

megabytes per second (Mbps) (T-1) to flagships via commercial satellites. The demonstrations proved that a commercial SATCOM link could reliably operate full duplex at a T-1 data rate. The concept blossomed and OPNAV found funding to continue the testing.

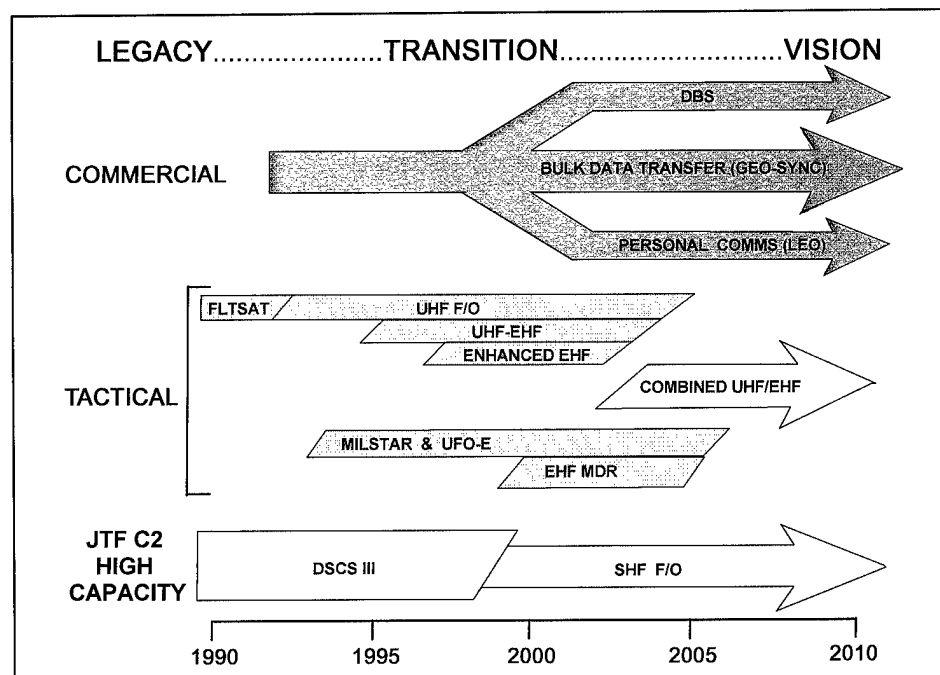
The project was expanded to lease satellite transponders to cover most of the world and to install terminals on most carriers and flagships. This step gave battle group commanders access to imagery, the Secure Internet Protocol Router Network (SIPRNET), the Non-secure Internet Protocol Router Network (NIPRNET), video teleconferencing (VTC), tele-medicine, and other information sources on demand.

Currently, the Navy's Challenge Athena program, through the Defense Information Systems Agency's (DISA) Commercial Satellite Communications Initiative (CSCI), is the leading DoD user of commercial SATCOM bandwidth. The Navy's success with Challenge Athena prompted the Joint Staff and DISA to reevaluate existing paradigms

regarding commercial SATCOM services and to appreciate the inherent, value-added features. DISA and the services are seeking to capitalize on the commercial sector's investments in existing and planned services. This is currently being accomplished as Navy and DISA cosponsor an initiative to investigate the possible exploitation of emerging Ka-band systems to augment DoD satellites in the year 2001 and beyond.

Based on current projections in the Navy's Emerging Requirements Database (ERDB), the Navy's 2010 DISN bandwidth requirement for the "Peace Plus Small Scale Contingency — Peace Enforcement" scenario, which is the benchmark for normal day-to-day operations, is in excess of 171 Mbps. This bandwidth will be required to support two aircraft carrier battle groups (CVBG), two amphibious readiness groups (ARG), as well as day-to-day Fleet operations.

Both Naval Sea Systems Command and Naval Air Systems Command are developing combat systems that require large imagery and data files to update



A future DoD satellite communications architecture focuses on follow-on SHF and combined UHF/EHF systems with significant commercial use.

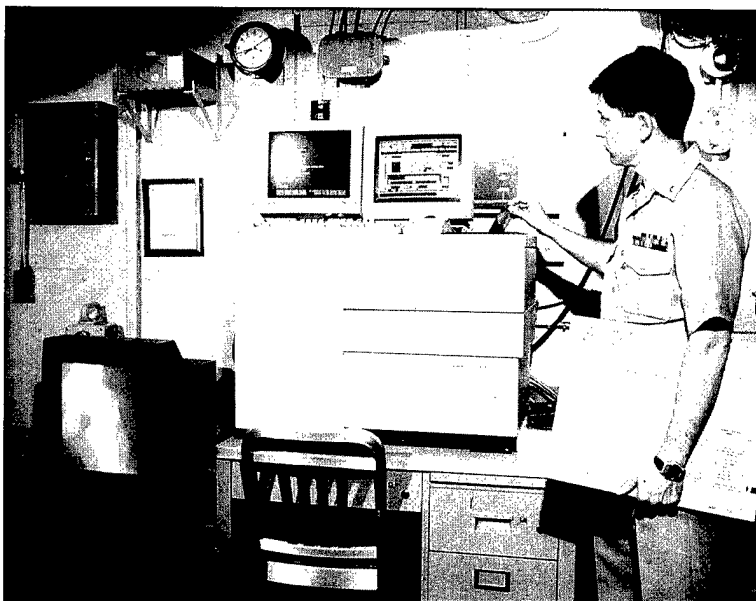
shipboard weapon systems. The bandwidth required to transfer this data greatly exceeds current communication systems capacities. The CA capability will be extended to as many as 18 large-deck ships to help satisfy those needs. Although commercial SATCOM may be capable of supporting much of the growing bandwidth requirements, DoD will not put all of its sensitive eggs into the commercial basket. Commercial systems will be used only where militarily and economically feasible. There are requirements that must be transported on protected systems under strict U.S. control, and in most cases that means systems that are owned and operated by the U.S. Government.

Exploiting X-Band, Ka-Band

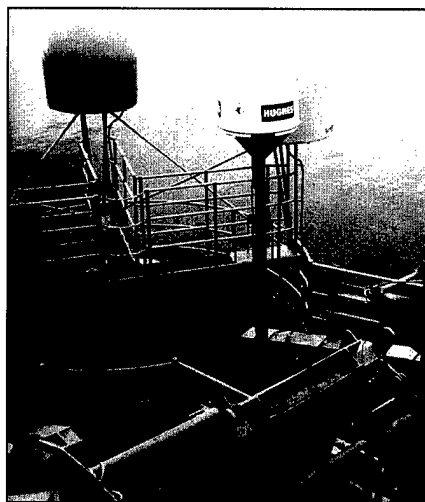
Supporting the expanding bandwidth and terminal requirements is a huge task being addressed by Navy's Information Technology for the 21st Century (IT-21) initiative under the sponsorship of the Chief of Naval Operations/N6 (OPNAV).

The Navy is committing resources to expand its DSCS X-band capability by procuring over 100 AN/WSC-6 type terminals over the next five years. Because accesses to the DSCS are prioritized and assigned according to CINC requirements, many WSC-6-equipped ships may not be assigned a SATCOM access. As the number of shipboard terminals increases, Navy will rely on the three new enhanced, high-powered DSCS satellites to support them.

The Navy is active in the joint development of new military SATCOM systems and terminals that will be compatible with shipboard design and antenna size that will function on a platform afloat. These include the Advanced EHF system, the Mobile User Objective System, and the Wideband Gapfiller System (WGS).



High-quality imaging for shipboard medical evaluations is among the many services provided through the Challenge Athena initiative.



A Hughes DirectTV antenna installed on USS Abraham Lincoln receives Global Broadcast Service broadcasts.

The WGS is expected to provide both X-band and Ka-band payloads.

The Global Broadcast Service (GBS), which operates on the UHF Follow-On (UFO) system, will provide simplex high data-rate service to afloat users via military-owned satellites operating in the Ka-Band. Currently two of three UFO satellites carrying GBS payloads have been launched, and initial operational capability for GBS is anticipated in the spring of 1999.

To provide deployed naval forces and Joint Task Forces a full-time gateway into the Defense Information System Network (DISN), DoD is currently planning to

develop a system of Teleports. This will include an expansion of the Standard Tactical Entry Points (STEPs) to enable flexible connectivity in the UHF, SHF, EHF and commercial SATCOM media. Teleports will be a major step toward a seamless, interoperable DISN providing bandwidth on demand.

The Navy will actively participate in all aspects of

the development of DoD Teleports to ensure that the needs of the Fleet are met. With its three Naval Computer and Telecommunications Area Master Stations (NCTAMS) and the expanding capabilities of a new NCTAMS EURCENT Detachment in Bahrain, the Navy already has a significant investment in a prototype teleport architecture. The multi-band, multi-mode, cross-banding, and resource sharing that is inherent with the teleport concept of operations, coupled with Challenge Athena and further commercial SATCOM expansion, is the complex solution to meet the Navy's projected bandwidth requirements both in the near term and through the year 2010.

Bandwidth requirements for the deployed naval warfighter will continue to increase. The Navy continues to vigorously evaluate opportunities in the commercial sector to seek a capability for bandwidth on demand - with worldwide coverage - at an economical cost. The Navy must proceed "all ahead full" with the expansion of Challenge Athena, stay at the forefront of other commercial SATCOM acquisition, and aggressively assume the role of acquisition manager for civilian Ka-band SATCOM services for DoD.

Author Robert Patterson was a senior engineer with Femme Comp, Inc., supporting Naval Space Command's SATCOM Plans Branch.

Space is another medium in the warfighting continuum that Navy must exploit to influence events ashore from the sea — anytime, anywhere

A Naval Concepts-Based Vision for Space

**By Cmdr. Randall G. Bowdish
and Cmdr. Bruce Woodyard**

From strategic early warning to tactical communications, the U.S. Navy uses space 24 hours a day, across the full range of operations. Rugged systems, small enough to be installed on ships, aircraft, and land vehicles — even carried on the backs of Marines and SEALs — yet capable enough to connect globally deployed expeditionary forces, depend on space-based assets.

Some of this dependence on space evolved ad hoc and some by design. It is time to reflect upon the implications of our reliance upon space as it pertains to present and future naval operations. Potential adversaries certainly recognize our dependence on space as a critical vulnerability central to our combat capability. Consequently, our space-based capabilities must be not only rugged, but also well-defended.

Space & Navy's Role in National Security

Space will play an increasingly important role in the accomplishment of national security objectives. In 1996, commercial space revenues exceeded government space expenditures for the first time. The U.S. currently has more than \$100 billion invested in space. More than 1,000 satellites are expected to be launched in the next decade, representing an investment of more than one-half trillion dollars.

As much of our economy becomes information-based, and as a large segment of information assets migrate to Earth orbit, our nation's prosperity will become inextricably linked with space capabilities.

The National Military Strategy emphasizes the importance of information links between our globally dispersed forces. In short, access to and use of information enhances all aspects of mili-

tary operations, and this information increasingly will be collected from and disseminated through space.

Though a maritime service, the Navy has not been limited to operations at sea. Sea control must take priority when there is a blue-water threat, but when such a threat does not exist — or when sea control has been established locally — the Navy can turn its attention to other functions, such as projecting power inland from the sea or supporting land operations.

This integrated, cross-dimensional, multi-function approach has been applied throughout the course of our naval history to incorporate new technologies, resulting in advanced capabilities. When the Navy adopted aviation, it did not form a separate entity, such as the U.S. Army Air Corps. Rather, it integrated aviation into Fleet operations to enhance and fulfill traditional naval roles, whether gunfire spotting, attacking enemy warships, or providing support for troops ashore.

Witness today's Fleet. Surface combatants and submarines now are strike platforms by virtue of their Tomahawk-launching capability. The future of military units is not narrow specialization, but multimission capability that can be used across the spectrum of conflict in and through all media. The Navy-Marine Corps team, the original joint forces, is the only combined-arms, multimedia service that can bring full force to bear from every dimension.

Space is yet another medium in the warfighting continuum. Naval forces inherently understand how to conduct sustained, expeditionary operations in and from vast, inhospitable environments, be they the ocean of Earth or the ocean of space. Spacefaring nations will use space as seafaring nations historically have used the sea — as an international arena for unrestricted economic and military activity.



This view is consistent with current naval doctrine of using the sea as a maneuver and basing environment to influence events in the littorals, where the bulk



Space systems enhance the multi-mission capabilities of every war-fighting element of the Navy-Marine Corps team, operating across every spectrum of conflict..

of human activity, economy, and conflict takes place. Given this understanding, it is clear that the Navy should use space as it uses the sea.

Concepts

A globally dispersed and engaged Navy relies on space systems to enable its strategic concepts — forward presence, deterrence, power projection, and sea and area control — by providing:

- Warning and communication for deployed nuclear forces
- Coordinating presence operations to stabilize key regions
- Bringing the right force to bear in response to crises
- Linking sensors and weapons together to effect control of a theater

If the Navy is to achieve a network-centric force in the coming years, it is imperative that the Fleet be supported by space-based capabilities derived from a coherent set of space concepts linked comprehensively to strategic concepts.

We believe the Navy's vision for space in the 21st century should be founded on three concepts:

- Warfighter support
- Space control
- Force on demand

Warfighter support and space control together constitute naval space operational concepts. Combined with force on demand, they complement naval strategic concepts as they pertain to naval forces.

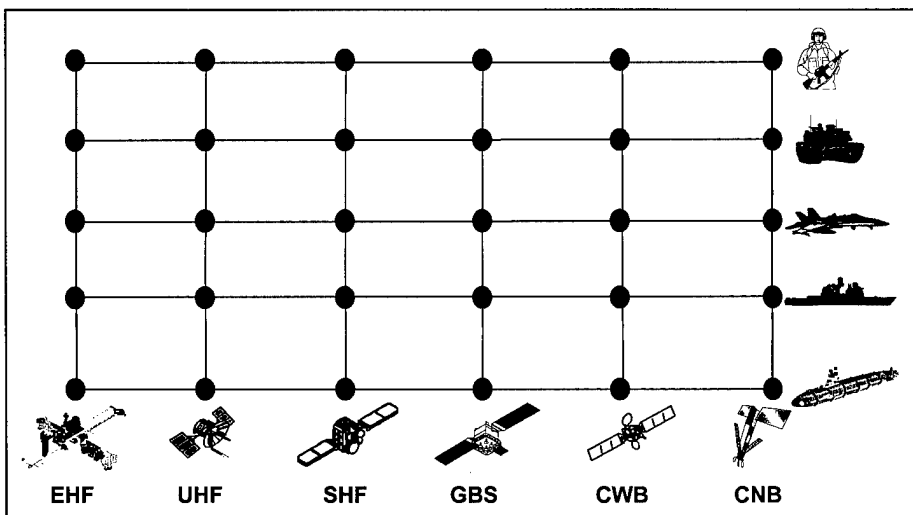
Underlying these concepts is the use of network centric warfare to harness the power of information in an architecture largely dependent on space systems. Particularly important in this context will be giving on-scene commanders uninhibited access to any type of required information, which, in turn, depends upon connectivity.

Naval Space Concepts

Warfighter support. Enhancing the operations of our combat forces in the conduct of their missions is the primary purpose for naval use of space. Naval forces are the most critically dependent on space-based information simply because they are the forces that have no other option. Ships cannot remain tied to cable networks or rely on fixed antennae. Whether for communications, intelligence, navigation, or meteorological and oceanographic data, naval forces will require supporting information derived from and passed through space. These support functions largely have migrated to space. In some cases, the requirement for these services can be satisfied only by space-based assets.

Space control. We must ensure our freedom of operations in space and, if necessary, deny that freedom to adversaries. Access, protection, surveillance, negation, and prevention are required to ensure critical support reaches combat forces anytime, anywhere. Space control is not an end in itself; rather, it is carried out to support operations on Earth.

Because freedom of the seas is an essential principle of seafaring nations, unhindered access to space will be essential to spacefaring nations. This means assured, on-call launch, recovery, repair, reconstitution, and on-orbit operations of space assets.



Satellite communications is the backbone of the naval battle cube — the information grid — that ties together sensor systems and weapon systems in a "network centric" battlespace.

A Vision for Space

(Continued from page 9)

Though the Navy does not itself maintain a launch capability — indeed, all Defense Department space launch is largely outsourced — secure and reliable launch and reconstitution must remain ahead of foreign government and commercial capabilities.

Protection ensures the reliability, availability, and integrity of information that goes to the combat forces. Not only our satellites but the entire space system — launch facilities, ground relay stations, and data links — is vulnerable to disruption by conventional attack, sabotage, or information operations. Access, surveillance, and protection absolutely require joint, interagency cooperation to ensure that our operations are assured, our systems are safe, and information to the end user is secure and reliable.

Prevention and negation are crucial to denying adversaries the use of space. Prevention consists of those measures taken to preclude an adversary's hostile use of space systems and services, including active, passive, or diplomatic means to ensure that adversaries do not have access to space-based command-and-control or communications links, sensors, imagery, or payload and mission data.

Negation defines those measures taken to disrupt, deny, degrade, deceive, or destroy an adversary's use of space systems and services. Hostile space systems will be engaged at all levels, including control and launch facilities, data links, and orbital assets. Information operations as well as methods that inflict physical damage can be used to support theater commanders or effect control of space.

Force on demand. This naval space concept places a power-projection capability in space, deployed on demand as conditions warrant. Although we do not presently possess this ability — and fielding such assets is against present national policy — the need may still arise. Space-to-Earth weaponization is not consistent with national policy, but the objective is to plan for the future by developing the



required capability should the need materialize.

No nation wants another's power-projection capability orbiting overhead. While many see the obvious benefits of being able to apply force from space, the unintended consequences may prove disadvantageous. A backlash is likely, with a space weapons race probable.

Nevertheless, we cannot ignore the issue. It is the responsibility of the military to ensure that the nation is not caught flat-footed on national security issues. Deployment on demand of space-based weapon systems would ensure U.S. dominance in space and secure our interests on the planet without creating the inevitable instability associated with permanently-based orbiting weapons.

Supporting Space Operations

What do these concepts mean for naval capabilities? It does not necessarily mean that the Navy will conduct warfare in or from space, but neither does it limit us in future developments. While the near-term focus should remain on supporting warriors on Earth, it is not difficult to imag-

ine ships or aircraft with space-surveillance radar, antisatellite, or orbital launch capability, or lasers that can dazzle hostile satellites. Just as space power supports naval forces, naval assets must support all aspects of space operations.

Naval forces need a concepts-based vision for space. It must be clear, shared, and serve as a template for the naval use of space. With the proliferation of space systems throughout the military and commercial sectors, clearly defined operational concepts must guide our developing capabilities. We must commit to a naval space vision, ensuring that we stay true to it in our acquisition, training, and fielding of our 21st-century naval forces.

Cmdr. Bowdish and Cmdr. Woodyard authored this article while serving as strategic planners on the staff of the Chief of Naval Operations in the Strategy and Concepts Branch. Reprinted from Proceedings with permission; Copyright © (1999) U.S. Naval Institute.

NEWS BRIEFS

GPS Achieves Y2K Compliance

The Department of Defense Global Positioning System (GPS) Joint Program Office has recently verified that all generations of GPS satellites and ground support systems are Y2K and End of Week (EOW) rollover compliant.

The GPS EOW rollover happens every 20 years because GPS system time, counted in weeks, started counting on Jan. 6, 1980. At midnight between Aug. 21 and 22, 1999, the GPS week will rollover from week 1023 to 0000. This is significant because it is the first EOW rollover since the GPS constellation was established and could be interpreted as an invalid date in GPS receivers that were not designed to meet GPS specifications.

The GPS, made famous by Desert Storm, is an integral navigational tool for both military and civilian users because of its accuracy and flexibility.

The GPS Y2K issue stems from the fact that many computer programs use a two-digit date field and assume that the year is 19XX. When the year 2000 occurs within the program, the two-digit date becomes "00" and could be interpreted as an invalid date. As with the EOW rollover, if receivers were manufactured according to GPS specifications, then this issue will not be a problem.

End user systems of GPS must verify that their receivers and applications, like electronic charting systems, will also work properly throughout these events. It is the responsibility of users to determine if their particular receivers and applications are Y2K and EOW compliant.

The U.S. Air Force GPS Joint Program Office has conducted extensive testing of military receivers. Test results may be viewed at the GPS JPO Y2K Web Site

<<http://www.laafb.af.mil/SMC/CZ/homepage/y2000/index.html>>.

Military users of commercial GPS receivers can also check the GPS JPO Y2K Web Site or contact receiver manufacturers to verify receiver EOW and Y2K compliance.

The Department of Transportation is the primary interface for all civil GPS matters and created the Civil GPS Service Interface Committee to meet this obligation. Since 1996, this committee has been actively informing the public about GPS Y2K and EOW issues. Relevant information, such as a list of receiver manufacturers and points of contact for the public, is posted on the Coast Guard Navigation Center's Web Site <<http://www.navcen.uscg.mil>>. —
Source: NORAD/USSPACECOM

NAVSPACECOM Hosts Space Intel/Ops Course

Naval Space Command hosted the Interservice Space Intelligence Operations Course (ISIOC) on Feb. 23 through March 4 at NAVSPACECOM headquarters in Dahlgren, Va.

The ISIOC is a familiarization course designed for intelligence and space operations officer specialties and civilian equivalents, with newly assigned duties involving space operations that require a basic knowledge of space. The course focuses on the joint application of space-related intelligence. It examines the basic theory and fundamentals of operating in the space environments; space and law policy; military space organizations and missions; U.S. and other countries' space systems and operations; space-related intelligence structure; and the tactical exploitation of national capabilities.

The target audience is O-4 and below and civilian equivalents with the appropriate security clearance. (O-5 and civilian equivalents may attend if they have a waiver from the instructor.)

Space Training Courses Offered

Interservice Space Intelligence Operations Course (ISIOC)

The ISIOC is offered to military and civilian personnel (O-4 and below) at the SI/TK level, in all the armed services who work as space system operators. This course is also excellent for those involved in command and control warfare (C2W) activities. Remaining class dates for FY99 are as follows:

14 JUN - 25 JUN

02 AUG - 13 AUG

23 AUG - 03 SEP

Interservice Space Intelligence Operations Senior Course (ISIOSC)

A condensed version of ISIOC, the ISIOSC is offered for senior officers, O-5 and above, also at the SI/TK level. Remaining class dates for FY99 are as follows:

13 JUL - 16 JUL

21 SEP - 24 SEP

Interservice Space Fundamentals Course (ISFC)

The ISFC is offered to Army, Air Force, Navy and Marine Corps officers, enlisted personnel, and civilian employees entering nonoperator staff positions who need to be knowledgeable of space operations, activities and environment. This course covers a fundamental presentation of the physical environments of space and the potential effects on manned and unmanned space systems. ISFC is offered at the Secret clearance level. Remaining class dates for FY99 are as follows:

07 JUN - 18 JUN

19 JUL - 30 JUL

16 AUG - 27 AUG

13 SEP - 24 SEP

All courses are conducted at the Air Education and Training Center, Colorado Springs, Colo., unless otherwise indicated. To obtain a quota, or for further information, contact Bonnie Watson at commercial (540) 653-5151, DSN 249-5151, or email bwatson@nsc.navy.mil. The following information is needed to obtain a quota: name, rank/rate/designator, Social Security number, UIC, billet title, and phone/FAX.

Modern Satellite Operations



This tracking and control site at Point Mugu, Calif. (left photo), is one of four TT&C facilities worldwide that belong to the Naval Satellite Operations Center. Detachment Delta (right photo) is co-located at Schriever Air Force Base in Colorado Springs, Colo., and performs satellite operations in coordination with the 3rd Satellite Operations Squadron.



Naval Satellite Operations Center (NAVSOC), one of the nation's first space-related military commands, has been operating spacecraft from its headquarters located at Point Mugu, Calif., for more than 36 years.

NAVSOC was originally established in April 1962 under the name Navy Astronautics Group (NAVASTROGRU) to operate TRANSIT, the Navy Navigation Satellite System (NNSS).

In addition to the headquarters facility, remote tracking, telemetry and commanding (TT&C) facilities support the mission from Laguna Peak near Point Mugu; Detachment ALFA at Prospect Harbor, Maine; Detachment CHARLIE at Finegayan, Guam; and Detachment DELTA at Colorado Springs, Colo.

NAVSOC reports to Naval Space Command, an Echelon 2 command that reports to both the Chief of Naval Operations and the United States Space Command.

NAVSOC personnel pioneered space system operations when they developed, tested, and implemented the procedures to operate and manage the first operational American space system. The constellation of TRANSIT satellites broadcasted continuous navigation messages,

providing accurate, all-weather satellite positioning capability to naval forces. Modern technology used in the Global Positioning System (GPS) closed the book on the world's first satellite navigation system and TRANSIT operations were terminated at the end of 1996.

NAVSOC has been a leader in implementing new operating concepts and has continued to modernize and upgrade its facilities. Navy allied with the Air Force Consolidated Space Operations Center (CSOC) in January 1996 for the sharing of antenna resources via the "plug and use" concept.

The NAVSOC concept of operations calls for satellite managers on duty around the clock to perform operations on all satellites with satellite engineers on call for engineering support to individual operations. As a result of modernization and efficiency, NAVSOC has reduced manpower by 40 percent while increasing mission capability by 300 percent.

The NAVSOC Laguna Peak Facility is located three miles from NAVSOC headquarters and supports ultra-high-frequency (UHF) and Satellite Ground Link System (SGLS) satellite TT&C operations.

One of the original sites, NAVSOC's

Detachment ALFA, is located at Prospect Harbor, Maine and supports satellite TT&C through SGLS, UHF, and extremely-high-frequency (EHF) capabilities.

NAVSOC Detachment CHARLIE, located at Finegayan, Guam, was established in 1993 and serves as NAVSOC's third satellite Earth station. Detachment CHARLIE has Doppler and telemetry collection capabilities as well as EHF tracking and commanding capabilities.

NAVSOC Detachment DELTA was established in 1988 and is located in Colorado Springs, Colo., within an Air Force facility at Schriever Air Force Base. The detachment's primary function is to serve as an alternate Satellite Operations Center (SOC) to the Point Mugu headquarters and to coordinate scheduling with the Air Force. In the event of a disaster in the Point Mugu, Calif., area, Detachment DELTA can perform and coordinate satellite operations until Point Mugu is restored.

NAVSOC's current mission assignments include the operation of Fleet Satellite (FLTSAT), UHF Follow-On (UFO), FLTSAT EHF Package (FEP), GEOSAT Follow-On (GFO), and Polar-EHF satellite constellations.

The Piper

By Gary R. Wagner



Lieutenant Commander Mark Sanford, a fleet support naval officer at Naval Space Command who specializes in providing hi-tech space support to the Fleet, occasionally takes on a very different role with ancient roots — that of “the piper.”

Clad in a Scottish kilt and other gaelic accouterments that date from the 15th century, Sanford becomes the bagpiper for military ceremonies such as retirements, dinners and other celebrations.

Bagpipes were generally known to exist in Europe and western Asia during the time of ancient Rome. But because they were fashioned almost completely from organic materials including wood and animal skins, and used primarily by peasants,

farmers and shepherds, there is not much historical information or evidence regarding their origins.

But late in the middle ages, bagpipes started appearing in artwork of the period, and the first definitive description of bagpipes was published in 1619 in an illustrated book on organography.

The association of bagpipes with warriors and warfare can be traced to the early 1400s where they accompanied Scottish highlanders onto the battlefield against their Norman enemies. The bagpipe’s distinctive drone and high-pitched notes could be heard for miles over moor and meadow. The haunting melodies of the bagpipe — floating on the air from every direction — no doubt sent a chill down the spine of the uninitiated.

Sanford first starting playing the bagpipe while stationed in Scotia, N.Y., as officer in charge of the Personnel Support Activity Detachment. While there, he attended a military retirement that featured a Navy ensign playing a bagpipe during the ceremony.

Sanford took lessons from the officer for a year, and then went on to study under the tutelage of Donald Lindsay in Albany, N.Y. “He is a premier instructor in the classical style of bagpipe music called *piobaireachd* (pea-brock) in Gaelic,” explains Sanford. “It’s a richer type of music, different from the lighter marches, reels, and jigs.”

While Sanford had learned to play other musical instruments in school — including the clarinet, saxophone, and trombone — learning the bagpipes was a whole new experience. “You have to keep a constant squeezing pressure on the bag to get the right sound while fingering the pipe to make the right notes,” he said.

Then add marching. While in New York, Sanford joined the Adirondack Pipes and Drums, a band of a dozen pipers and half-dozen drummers based in Glen Falls. The group toured as far south as Fair Hills, Md., and north to the North American Championship in Maxville, Ontario. They also played at other Scottish “highland games” and parades.

After Sanford transferred to Naval Space Command in 1997, he joined a larger band of 20 pipers and a dozen drummers at Mary Washington College in nearby Fredericksburg, Va. The group, composed of students and members of the community, has played at college athletic events, parades, and highland games in Fredericksburg, Richmond, Williamsburg, and Alexandria, Va.

Since he’s been stationed at Dahlgren, Sanford has also been featured in a number of military ceremonies. He has piped for retirements, a dining out for the Naval Reserve at the Army-

Piper

(Continued from page 13)

Navy Club in Washington, D.C., and at Navy and Marine Corps birthday celebrations in Dahlgren and Fredericksburg.

Whenever Sanford performs, he dons a traditional costume, including a wool kilt. "The plaid pattern of the material is the official U.S. Navy tartan borrowed from the town of Edzell, Scotland, which used to be the site of a Navy communications station," comments Sanford.

His costume also includes a knife, or dagger, called a *sgian dubh* (skeen-do) slipped into one of his high stockings. "In ancient Scotland, if you were visiting the home of a friend, you would put your knife in your stocking to show that you weren't hiding a weapon," explains Sanford.

The bagpipe he uses is a combination of modern and more traditional materials. The cloth bag of his instrument features a gortex lining, much more durable than the traditional sheepskin or cowhide bags. The pipes are plastic, as opposed to wood, but cane reeds are still used inside the chanter or melody pipe and drone pipes to produce the instrument's characteristic tones.

According to Sanford, a basic instrument will cost anywhere from \$700 to \$1,000. A set of antique pipes can sell for \$5,000 or more.

It wasn't until after he starting learning to play the bagpipes that Sanford discovered he had family roots in Scotland. His great grandmother's family was part of the Clan McLeod, and in his father's ancestry he found some Scots from the Clan Campbell.

While he views "piping" as a hobby at present, Sanford nevertheless practices at least three hours a week. And interspersed with his travel as a member of NAVSPACECOM's Naval Space Support Team, he stays busy with performances about once a month during a typical season from Memorial Day through mid-September.

AFCEA Honors NAVSPACECOM Member

Capt. Sheila McCoy, director of Naval Space Command's Information Systems Division, was named AFCEAN of the Month for February. The award is sponsored by AFCEA International — a non-profit organization for professionals in communications, electronics, intelligence, and information systems — to recognize dedicated service to AFCEA.

Capt. McCoy was instrumental in establishing a new AFCEA chapter at Dahlgren in November 1998, and currently serves as chapter president. She has previously served as secretary and vice president for membership with AFCEA's NOVA (Northern Virginia) chapter and as president of the Monterey Chapter. She was selected to serve with AFCEA's International headquarters as a Senior Navy Fellow from 1993-1994.

During her 23-year Navy career, Capt. McCoy has served in diverse assignments related to information technology operations and planning. She has worked in



Capt. McCoy

the World Wide Military Command and Control System joint program office, at Naval Communications Area Master Station Western Pacific in Guam as head of site operations, and with the Joint Staff

in the Command, Control, Communications and Computer Systems directorate. She commanded Naval Facility Coos Head in Charleston, Oregon, successfully implementing a project to transition the undersea surveillance system to new technology.

Capt. McCoy served with the Bureau of Personnel as program manager for the worldwide personnel and pay system and the Navy Standard Integrated Personnel System (NSIPS) prior to her transfer to Naval Space Command.

Decorated Service

Navy & Marine Corps Achievement Medals

OS2(SW) Nathan A. Williams ... for service as track supervisor and Joint Maritime Command Information Systems (JMCIS) operator aboard USS *Clark* (FFG 11) from January 1996 to December 1998.

CTA2 Lisa A. Munro ... for service as a space surveillance officer and Operations Center leading petty officer at Naval Space Command from January to December 1998.

OS2 Joseph A. Wilson III ... for service as a space warning petty officer and operations training petty officer at Naval Space Command from May 1997 to May 1999.

U.S. Navy Expert Rifle Medals

Capt. Andrew Straley
Lt.Cmdr. Michael G. Larios
Lt. Gary L. McKenna

U.S. Navy Expert Pistol Medals

Lt.Cmdr. Michael G. Larios
Maj. Mike McDonald
ISSN Keith R. Kappel
Lt. John C. Prohaska
Lt. Gary L. McKenna
Capt. Andrew Straley

Good Conduct Medals

IS2 John Fritz (2nd)
OS2 William Bradshaw (3rd)
OSC Timothy Carpenter (5th)
YN1 Mark Clancy (5th)
RMC Bobby Lowery (5th)

Letters of Commendation

RM2 Erich C. Spiers
Susan P. Wright
Bobbi J. Andersen

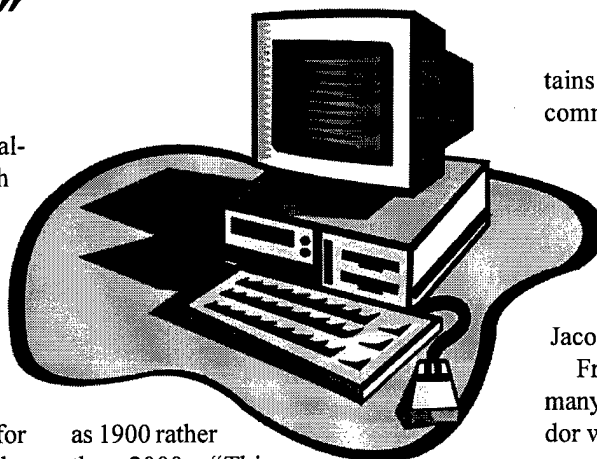
Letters of Appreciation

Lt.Cmdr. Michael Leonard
OS2 Jessie V. Woods
IS2 Walter J. Lloyd
YN2(AW) Joseph D. Parent
CTO3 Tania E. Jones

What Does "Y2K" Mean to You?

Home computer systems may malfunction or fail completely with the rollover into the new millenium, depending on the hardware and programs you are using. Why does the arrival of the Year 2000 portend such disaster for computers, and what can you do to ensure you don't have a problem?

As Diane Jacobs, Y2K coordinator for Naval Space Command, explains it, the Year 2000 problem stems from the inability of computer hardware and software to properly recognize 21st century dates. Many computer systems identify the year using only two digits, which means those systems would mistake a "00" date field



as 1900 rather than 2000. "This situation could cause anything from calculation errors to complete system failures," says Jean Rowe, who oversees Naval Space Command's Y2K testing efforts.

One caution everyone can take, main-

tains Jacobs, is to continually monitor commercial-off-the-shelf (COTS) programs used by computers at home, as well as in the office. "We have found systems as well as COTS products identified as Y2K compliant two years ago that are now listed as not compliant," says Jacobs.

Free down-loadable Y2K patches for many COTS products are available at vendor web sites. However, it is incumbent upon the owner to monitor and access the vendor sites frequently to obtain the latest information.

"This fall, everyone should recheck their products on the vendor's homepage and take whatever precautionary measures they recommend," advises Jacobs.

CALENDAR

Meetings & Symposia

National Space Forum, June 2-3, Washington, D.C. Sponsored by the American Astronautical Society and National Space Club. Call (703) 866-0020 or www.astronautical.org.

Surveillance & Reconnaissance Conference, June 3-4, Washington, D.C. Sponsored by the American Institute of Engineers and the Society for Computer Simulation International. Call (310) 563-1223 or www.ttcus.com.

GovTechNet International 99, June 15-17, Washington, D.C. Sponsored by AFCEA. Call (703) 631-6130.

Guidance, Navigation, and Control Conference & Exhibit, Aug. 9-11, Portland, Or. Sponsored by the American Institute of Aeronautics and Astronautics (AIAA). Call (800) 739-4424 or www.aiaa.org.

Courses & Seminars

Following courses sponsored by the Applied Technology Institute. Call (410) 531-6034; email atiinfo@aol.com. Course outlines are available on the Internet at <http://catalog.com/hitekweb/>.

- Satellite Industry Update: Present Status & Future Trends, June 7, College Park, Md.
- Small Remote Sensing Satellites, June 14-16, College Park, Md.

Following courses sponsored by the AFCEA Professional Development Center. Call (800) 336-4583, ext. 6135 or (703) 631-6135 or visit Web page <http://www.afcea.org>.

- The U.S. Intelligence Community: Who Does What, With What, For What?, May 18-20, Fairfax, Va. (classified Secret).

Following courses sponsored by the Technology Training Corporation. Call (310) 534-3922 or visit Web page <http://ttcus.com>.

- Tactical Battlefield Communications, June 8-10, Washington, D.C.
- Multiple Sensor Fusion & Target Tracking, June 29-July 1, Washington, D.C.
- Theater Missile Defense, June 22-23, Washington, D.C.

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